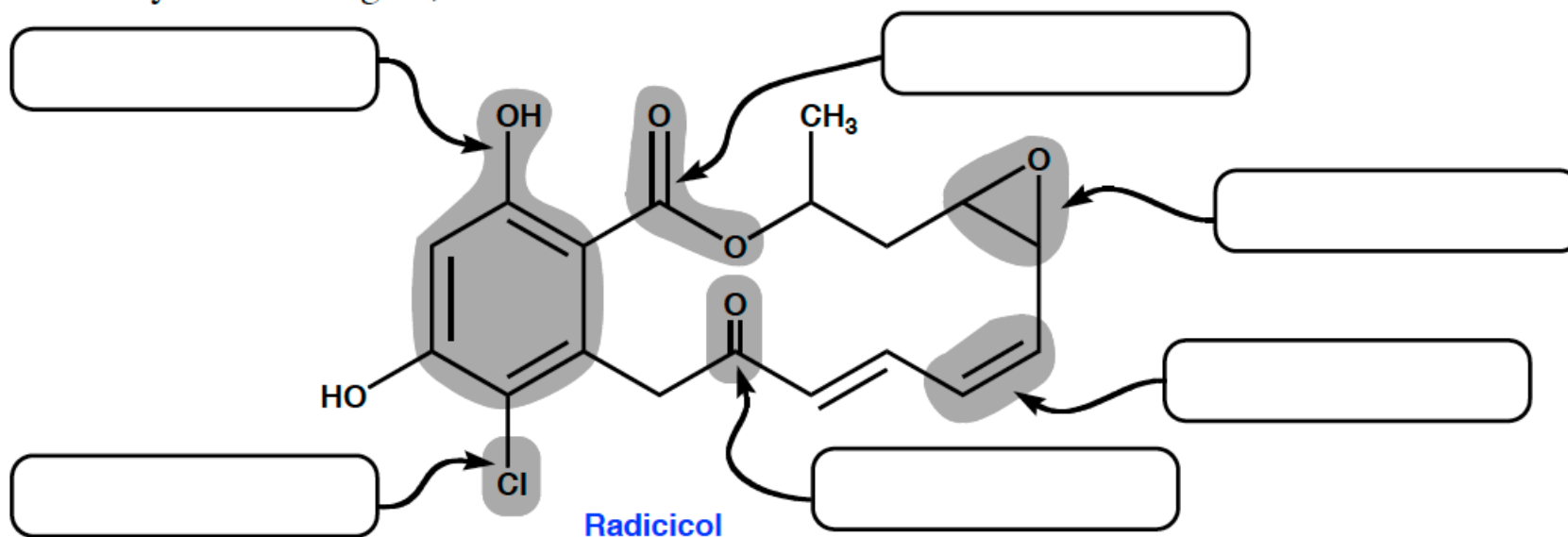


1) [10 pts.] Radicol, an organic molecule whose chemical structure is shown below, is produced naturally by the fungus *Monosporium bonorden*. Radicol has been found to exhibit a wide spectrum of biological activity making it the study of numerous medicinal investigations.

(i) In the boxes below, provide the name of the indicated functional group (each functional group is defined by a shaded region).



(ii) Indicate the total number of sp^3 carbon atoms present in Radicol. _____

(iii) Indicate the total number of methylene carbons present in Radicol. _____

(iv) Indicate the total number of methine carbons present in Radicol. _____

(v) Indicate the total number of sp^2 carbon atoms present in Radicol. _____

2) [7 pts.] Galanthamine is a phytonutrient extracted from the common snowdrop (*Galanthus nivalis*). The compound is claimed to enhance memory function and is said to be the same memory-function enhancer used 3200 years ago by the Greek hero Odysseus, the champion of memory and the enemy of forgetfulness.

(i) Draw all of the implied hydrogen atoms and lone pairs on the structure of galanthamine shown below. You do not need to show stereochemistry.

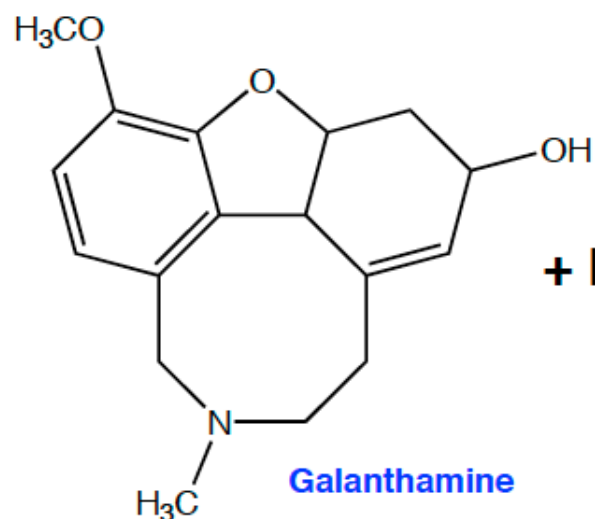
(ii) What type of amine is found in galanthamine (circle one)?

Primary amine

Secondary amine

Tertiary amine

(iii) Based on your knowledge of charge and stability, draw the structure of the most stable ionic compound that is formed when one molar equivalent of HBr (a strong acid) reacts with galanthamine. This is an acid-base reaction, not an addition reaction.



+ HBr →

implied atoms not required here